

What is claimed is:

1. A measuring device, a pH measuring device in particular, which has an elongated first electrode (2) having a longitudinal axis (7) for insertion into a material (16) to be measured and has a housing (3) which at least partially surrounds the first electrode (2),
5 characterized in that the first electrode (2) is designed to be movable in the axial direction (X) of its longitudinal axis (7).
2. The measuring device as recited in Claim 1,
characterized in that a receptacle device (17, 23, 26) is provided for accommodating one end (13) of the first electrode (2).
- 10 3. The measuring device as recited in Claim 2,
characterized in that the receptacle device (17, 23, 26) is made of an elastic material which yields in the axial direction (X) with a movement of the first electrode (2).
4. The measuring device as recited in one of Claims 2 or 3,
characterized in that the receptacle device (17, 23, 26) has a damping element (22, 25) or is
15 connected to a damping element which yields in the axial direction (X) with a movement of the first electrode (2) and thereby exerts a force directed in the opposite direction on the end (13) of the first electrode (2).
5. The measuring device as recited in Claim 4,
characterized in that the damping element (22, 25) is designed as a rubber buffer (25).
- 20 6. The measuring device as recited in one of Claims 4 or 5,
characterized in that the damping element (22, 25) is designed as a spring (22).
7. The measuring device as recited in one of Claims 4 through 6,
characterized in that the housing (3) has a base plate (12) on the side of the receptacle device (17, 23, 26) and the receptacle device (17, 23, 26) is part of the base plate (12).

8. The measuring device as recited in Claim 7,
characterized in that the base plate (12) is made of an elastic material.

9. The measuring device as recited in Claim 7 or 8,
characterized in that the base plate (12) is designed like a diaphragm and has folded sections
5 (21).

10. The measuring device as recited in Claims 2 through 9,
characterized in that the receptacle device (17, 23, 26) has a recess (17, 26) for form-fittingly
receiving one end (13) of the first electrode (2).

11. The measuring device as recited in Claim 10,
10 characterized in that a sealing device (28) is provided through which the one end (13) of the first
electrode (2) is in tight contact with the recess (17, 26).

12. The measuring device as recited in one of the preceding claims,
characterized in that the electrodes (2, 15) are glued or welded to the housing (3) or are encased.

13. The measuring device as recited in one of the preceding claims,
15 characterized in that contact rods (35, 36) are provided and are connected to the electrodes (2, 15)
which protrude through the base plate (12) and are bent on a bottom side (37) of the base plate
(12) so that the bent ends of these contact rods (35, 36) are threaded into eyes (38) provided
specifically for this purpose on the bottom side (37) of the base plate (12).

14. The measuring device as recited in the preceding claims,
20 characterized in that a chamber (14) which is enclosed by the housing (3) and is tight with
respect to the outside is provided; at least one second electrode (15) is provided between the first
electrode (2) and the casing (4), and the base plate (12) tightly seals a lower area of the chamber
(14).

15. The measuring device as recited in Claim 14,

characterized in that a polymer protolyte liquid is added to the chamber (14), surrounding the first and/or second electrodes (2, 15).

16. The measuring device as recited in the preceding claims,
characterized in that the first electrode (2, 47) is situated in a tube (32), in particular a glass tube
5 (32) to which an electrolyte liquid is added.

17. The measuring device as recited in Claim 16,
characterized in that the tube (32) is displaceable in the axial direction (X) toward the first
electrode (2).

18. The measuring device as recited in the preceding claims,
10 characterized in that the housing (3) is displaceably situated on a measuring tip (4) with respect
to the first electrode (2).

19. The measuring device as recited in the preceding claims,
characterized in that a diameter (d1) of the housing (3) decreases in the direction of a measuring
tip (4) of the first electrode (2).

15 20. The measuring device as recited in the preceding claims,
characterized in that the first electrode (2) and/or a protective sleeve (32) surrounding it is made
at least partially of glass.

21. The measuring device as recited in the preceding claims,
characterized in that the first electrode (2) is pivotably mounted.

20 22. The measuring device as recited in Claim 21,
characterized in that the first electrode (2) has pivoting means, in particular a joint via which the
first electrode (2) is pivotable away from the axial direction (X) in the case of a force component
(F_Y) perpendicular to the axial direction (X).

23. The measuring device as recited in the preceding claims,

characterized in that the housing (3) contains at least in part a SAN or ABS material.

24. A portable pH meter (40) having a modular replaceable pH measuring device (1, 10) as recited in one of the preceding claims.

25. The pH meter as recited in Claim 24,

- 5 characterized by a housing (41) in which a display (43) and a keyboard (42) are situated and by a circuit board (44) from which spring contacts (45) lead away to contacts (18, 19) of the first and second electrodes (2, 15), the contacts being situated on a bottom side (34) of the base plate (12).

26. A method for manufacturing a measuring device as recited in one of Claims 1 through 23, including the following assembly steps:

- 10 (a) encasing electrically conducting contact rods (35, 36) to form a base plate (12) out of which protrude the contact rods (35, 36) for a first and/or a second electrode (1, 15);
(b) adding an electrode liquid to a tube (32);
(c) inserting the first electrode into the tube (32) and gluing the tube (32) to the base plate (12);
15 (d) welding the base plate (12) to an empty casing (11) to form a housing (3) which has a chamber (14);
(e) adding a polymer protolyte liquid of the second electrode (15) into the chamber (14).

27. The method as recited in Claim 26,

- characterized in that the contact rods (35, 36) protruding out of the housing (3) are bent over to
20 form contacts on the outside wall of the housing (3).

28. Application of a measuring device as recited in one of Claims 1 through 23 or a meter as recited in one of Claims 24 or 25 to measure pH in foods, liquids containing protein or wastewater, the electrodes (2, 15) being surrounded by a polymer protolyte material.